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The Myth of Soil Amendments, Part IV

"Amending your soil with organic matter will improve water quality in streams"

The Myth

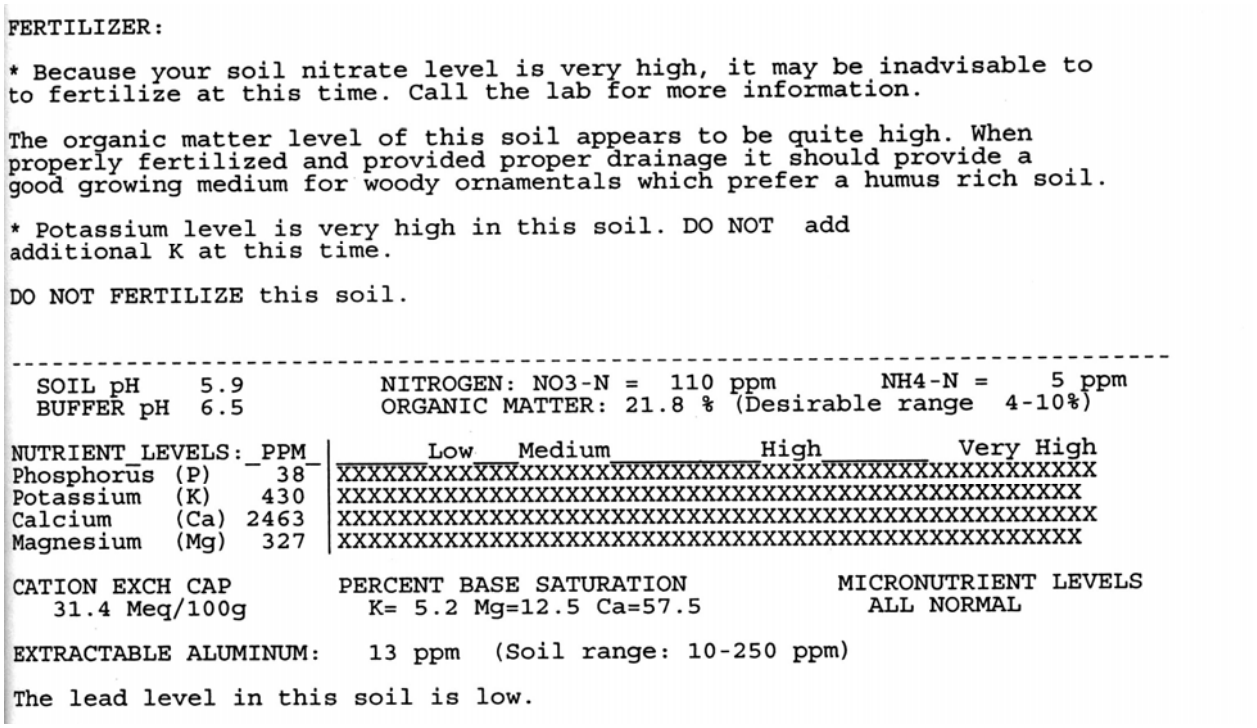
As the title of this column suggests, the myths surrounding the amendment of soil prior to woody plant installation are vast and firmly rooted. Soil amendment recommendations are found in the "building healthy soil" genre of popular literature and consist of sweeping generalizations regarding the benefits and uses of organic soil amendments. One of the purported benefits of soil amendment is "…storing fertilizers and natural nutrients for gradual release, while preventing them from washing into streams." Soil amendment is claimed to create "salmon-friendly soils", and lengthy documents are available that calculate fluff factors and finished grades for amendment. It all appears to be very scientific and logical.

The Reality

Once again this is a case of misapplying traditional, production-oriented agricultural practices to a permanent landscape system. Organic amendment of intensively managed agricultural soils is needed to replenish nutrients and improve soil structure. Such soils are adapted to annual disturbances and the plant material in question is harvested yearly. The same is certainly not true of permanent installations.

Over time, many undesirable things happen to permanent landscapes when soils are liberally amended with organic matter (OM). Restrictive soil interfaces are created, decomposition of OM causes subsidence, and plant health suffers; these problems have been discussed in previous columns. However, the claim that soil amendment prevents water pollution is simply not true and needs to be addressed.

Organic matter is fertilizer and is composed of the same elements that make up commercial fertilizers. If it is applied in excess, it will cause pollution problems just as surely as those commercial fertilizers do. It is true that organic matter provides a slow release of nutrients if used in moderation, but applying organic matter at unnaturally high rates means the nutrient release is likewise increased, as Figure 1 demonstrates. A heavily amended landscape soil (e.g. 33% OM) releases much greater amounts of nitrogen, phosphorus, and other nutrients than an ideal soil (i.e. 5% OM).



FERTILIZER:

* Because your soil nitrate level is very high, it may be inadvisable to to fertilize at this time. Call the lab for more information.

The organic matter level of this soil appears to be quite high. When properly fertilized and provided proper drainage it should provide a good growing medium for woody ornamentals which prefer a humus rich soil.

* Potassium level is very high in this soil. DO NOT add additional K at this time.

DO NOT FERTILIZE this soil.

SOIL pH 5.9 NITROGEN: NO3-N = 110 ppm NH4-N = 5 ppm
BUFFER pH 6.5 ORGANIC MATTER: 21.8 % (Desirable range 4-10%)

NUTRIENT LEVELS: PPM		Low	Medium	High	Very High
Phosphorus	(P)	38	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
Potassium	(K)	430	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
Calcium	(Ca)	2463	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
Magnesium	(Mg)	327	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		

CATION EXCH CAP: 31.4 Meq/100g
PERCENT BASE SATURATION: K= 5.2 Mg=12.5 Ca=57.5
MICRONUTRIENT LEVELS: ALL NORMAL

EXTRACTABLE ALUMINUM: 13 ppm (Soil range: 10-250 ppm)

The lead level in this soil is low.

Figure 1: Soil test from a 100% organic garden shows excessive nutrient loading due to high OM content (21.8%).

The root zones of newly installed plants, if installed properly, extend only a few inches into the soil. Any OM below this zone is unavailable to the roots and will end up in a different system – often an aquatic one. The practice of soil amendment is especially irresponsible when used in restoration of habitats near streams and other bodies of water. These terrestrial systems are rarely nutrient deficient, and the addition of high nutrient loads via organic amendment will result in increased water pollution.

There is a solid body of scientific research behind the issue of organic amendment contamination of aquatic systems. Most of this comes from the more traditional agriculture literature, but the concepts are just as applicable to urban landscapes when they are managed in traditional ways. Several recent studies have shown that:

- compost phosphate is highly soluble and elevates phosphate levels in aquatic systems;
- ground water quality is negatively affected by high nitrogen and salt levels during compost weathering;
- ammonium, potassium, phosphate, and sodium create surface water pollution during manure composting;
- high rates of soil amendment with manure leads to water contamination;
- nonpoint pollution of water resources by nitrate is caused by a combination of factors, including tillage and soil organic matter levels.

In the words of one author, “manures and fertilizers are applied to agricultural lands in excess of recommended amounts, resulting in widespread pollution of surface and ground water.” One can argue that urban landscapes and restoration sites are not agricultural lands. Ideally, that’s true. But when these urban landscape soils are managed like agricultural soils, then the same problems occur.

The Bottom Line

- High nutrient loading of soils is not a natural phenomenon in terrestrial systems.
- Any soluble nutrients not immediately utilized by microbes or plants contribute to non-point source pollution.
- Before adding any organic or inorganic fertilizer to a landscape, have a soil test performed to identify nutrient deficiencies.
- Permanent installations of trees and shrubs are not annual agricultural crops, and neither they nor the soils should be managed as if they were.

For more information, please visit Dr. Chalker-Scott’s web page at http://www.theinformedgardener.com.